

# MC10EL57, MC100EL57

## 5V ECL 4:1 Differential Multiplexer

The MC10/100EL57 is a fully differential 4:1 multiplexer. By leaving the SEL1 line open (pulled LOW via the input pulldown resistors) the device can also be used as a differential 2:1 multiplexer with SEL0 input selecting between D0 and D1.

The SEL1 is the most significant select line. The binary number applied to the select inputs will select the same numbered data input (i.e., 00 selects D0).

Multiple  $V_{BB}$  outputs are provided for single-ended or AC coupled interfaces. The  $V_{BB}$  pin, an internally generated voltage supply, is available to this device only. For single-ended input conditions, the unused differential input is connected to  $V_{BB}$  as a switching reference voltage.  $V_{BB}$  may also rebias AC coupled inputs. When used, decouple  $V_{BB}$  and  $V_{CC}$  via a 0.01  $\mu$ F capacitor and limit current sourcing or sinking to 0.5 mA. When not used,  $V_{BB}$  should be left open.

The 100 Series contains temperature compensation.

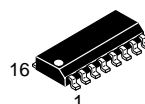
- Useful as Either 4:1 or 2:1 Multiplexer
- $V_{BB}$  Output for Single-Ended Operation
- ESD Protection: > 1 KV HBM, > 100 V MM
- PECL Mode Operating Range:  $V_{CC}$ = 4.2 V to 5.7 V with  $V_{EE}$ = 0 V
- NECL Mode Operating Range:  $V_{CC}$ = 0 V with  $V_{EE}$ = -4.2 V to -5.7 V
- Internal Input Pulldown Resistors on D(s) and SEL(s).
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level 1  
For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL-94 code V-0 @ 1/8", Oxygen Index 28 to 34
- Transistor Count = 109 devices



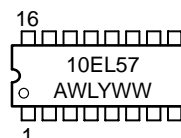
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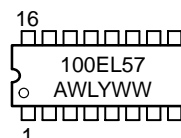
### MARKING DIAGRAMS



SO-16  
D SUFFIX  
CASE 751B



A = Assembly Location  
WL = Wafer Lot  
YY = Year  
WW = Work Week

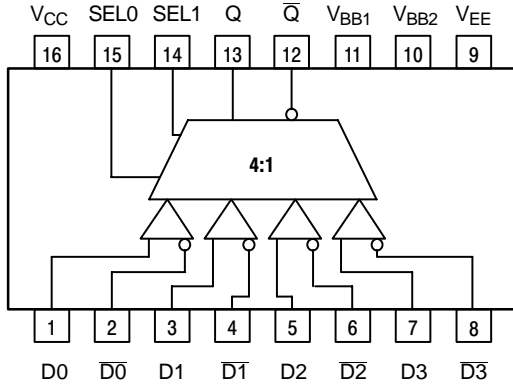


### ORDERING INFORMATION

Device	Package	Shipping
MC10EL57D	SO-16	48 Units / Rail
MC10EL57DR2	SO-16	2500 Units / Reel
MC100EL57D	SO-16	48 Units / Rail
MC100EL57DR2	SO-16	2500 Units / Reel

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## LOGIC DIAGRAM AND PINOUT ASSIGNMENT



FUNCTION TABLE

SEL1*	SEL0*	DATA OUT
L	L	D0
L	H	D1
H	L	D2
H	H	D3

\* Pin will default low when left open.

## PIN DESCRIPTION

PIN	FUNCTION
D0–3, $\overline{D0}$ –3	ECL Diff Data Inputs
SEL0,1	ECL Mux Select Inputs
Q, $\overline{Q}$	ECL Data Outputs
$V_{BB1}$ , $V_{BB2}$	Reference Voltage Output
$V_{CC}$	Positive Supply
$V_{EE}$	Negative Supply

## MAXIMUM RATINGS (Note 1)

Symbol	Parameter	Condition 1	Condition 2	Rating	Units
$V_{CC}$	PECL Mode Power Supply	$V_{EE} = 0\text{ V}$		8	V
$V_{EE}$	NECL Mode Power Supply	$V_{CC} = 0\text{ V}$		-8	V
$V_i$	PECL Mode Input Voltage	$V_{EE} = 0\text{ V}$	$V_i \leq V_{CC}$	6	V
	NECL Mode Input Voltage	$V_{CC} = 0\text{ V}$	$V_i \geq V_{EE}$	-6	V
$I_{out}$	Output Current	Continuous		50	mA
		Surge		100	mA
$I_{BB}$	$V_{BB}$ Sink/Source			$\pm 0.5$	mA
$T_A$	Operating Temperature Range			-40 to +85	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature Range			-65 to +150	$^{\circ}\text{C}$
$\theta_{JA}$	Thermal Resistance (Junction to Ambient)	0 LFPM	16 SOIC	130	$^{\circ}\text{C}/\text{W}$
		500 LFPM	16 SOIC	75	$^{\circ}\text{C}/\text{W}$
$\theta_{JC}$	Thermal Resistance (Junction to Case)	std bd	16 SOIC	33 to 36	$^{\circ}\text{C}/\text{W}$
$T_{sol}$	Wave Solder	<2 to 3 sec @ 248 $^{\circ}\text{C}$		265	$^{\circ}\text{C}$

1. Maximum Ratings are those values beyond which device damage may occur.

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## 10EL SERIES PECL DC CHARACTERISTICS $V_{CC}= 5.0\text{ V}$ ; $V_{EE}= 0.0\text{ V}$ (Note 1)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current			24			24			24	mA
$V_{OH}$	Output HIGH Voltage (Note 2)	3920	4010	4110	4020	4105	4190	4090	4185	4280	mV
$V_{OL}$	Output LOW Voltage (Note 2)	3050	3200	3350	3050	3210	3370	3050	3227	3405	mV
$V_{IH}$	Input HIGH Voltage (Single Ended)	3770		4110	3870		4190	3940		4280	mV
$V_{IL}$	Input LOW Voltage (Single Ended)	3050		3500	3050		3520	3050		3555	mV
$V_{BB}$	Output Voltage Reference	3.57		3.7	3.65		3.75	3.69		3.81	V
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range (Differential) (Note 3)	2.5		4.6	2.5		4.6	2.5		4.6	V
$I_{IH}$	Input HIGH Current			150			150			150	$\mu\text{A}$
$I_{IL}$	Input LOW Current	0.5			0.5			0.3			$\mu\text{A}$

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $+0.06\text{ V} / -0.5\text{ V}$ .
2. Outputs are terminated through a 50 ohm resistor to  $V_{CC}-2$  volts.
3.  $V_{IHCMR}$  min varies 1:1 with  $V_{EE}$ ,  $V_{IHCMR}$  max varies 1:1 with  $V_{CC}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{PPmin}$  and 1 V.

## 10EL SERIES NECL DC CHARACTERISTICS $V_{CC}= 0.0\text{ V}$ ; $V_{EE}= -5.0\text{ V}$ (Note 1)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current			24			24			24	mA
$V_{OH}$	Output HIGH Voltage (Note 2)	-1080	-990	-890	-980	-895	-810	-910	-815	-720	mV
$V_{OL}$	Output LOW Voltage (Note 2)	-1950	-1800	-1650	-1950	-1790	-1630	-1950	-1773	-1595	mV
$V_{IH}$	Input HIGH Voltage (Single Ended)	-1230		-890	-1130		-810	-1060		-720	mV
$V_{IL}$	Input LOW Voltage (Single Ended)	-1950		-1500	-1950		-1480	-1950		-1445	mV
$V_{BB}$	Output Voltage Reference	-1.43		-1.30	-1.35		-1.25	-1.31		-1.19	V
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range (Differential) (Note 3)	-2.5		-0.4	-2.5		-0.4	-2.5		-0.4	V
$I_{IH}$	Input HIGH Current			150			150			150	$\mu\text{A}$
$I_{IL}$	Input LOW Current	0.5			0.5			0.3			$\mu\text{A}$

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary  $+0.06\text{ V} / -0.5\text{ V}$ .
2. Outputs are terminated through a 50 ohm resistor to  $V_{CC}-2$  volts.
3.  $V_{IHCMR}$  min varies 1:1 with  $V_{EE}$ ,  $V_{IHCMR}$  max varies 1:1 with  $V_{CC}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{PPmin}$  and 1 V.

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## 100EL SERIES PECL DC CHARACTERISTICS $V_{CC}=5.0\text{ V}; V_{EE}=0.0\text{ V}$ (Note 1)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current			24			24			27	mA
$V_{OH}$	Output HIGH Voltage (Note 2)	3915	3995	4120	3975	4045	4120	3975	4050	4120	mV
$V_{OL}$	Output LOW Voltage (Note 2)	3170	3305	3445	3190	3295	3380	3190	3295	3380	mV
$V_{IH}$	Input HIGH Voltage (Single Ended)	3835		4120	3835		4120	3835		4120	mV
$V_{IL}$	Input LOW Voltage (Single Ended)	3190		3525	3190		3525	3190		3525	mV
$V_{BB}$	Output Voltage Reference	3.62		3.74	3.62		3.74	3.62		3.74	V
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range (Differential) (Note 3)	2.5		4.6	2.5		4.6	2.5		4.6	V
$I_{IH}$	Input HIGH Current			150			150			150	$\mu\text{A}$
$I_{IL}$	Input LOW Current	0.5			0.5			0.5			$\mu\text{A}$

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.8 V / -0.5 V.
2. Outputs are terminated through a 50 ohm resistor to  $V_{CC}-2$  volts.
3.  $V_{IHCMR}$  min varies 1:1 with  $V_{EE}$ ,  $V_{IHCMR}$  max varies 1:1 with  $V_{CC}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{PPmin}$  and 1 V.

## 100EL SERIES NECL DC CHARACTERISTICS $V_{CC}=0.0\text{ V}; V_{EE}=-5.0\text{ V}$ (Note 1)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$I_{EE}$	Power Supply Current			24			24			27	mA
$V_{OH}$	Output HIGH Voltage (Note 2)	-1085	-1005	-880	-1025	-955	-880	-1025	-955	-880	mV
$V_{OL}$	Output LOW Voltage (Note 2)	-1830	-1695	-1555	-1810	-1705	-1620	-1810	-1705	-1620	mV
$V_{IH}$	Input HIGH Voltage (Single Ended)	-1165		-880	-1165		-880	-1165		-880	mV
$V_{IL}$	Input LOW Voltage (Single Ended)	-1810		-1475	-1810		-1475	-1810		-1475	mV
$V_{BB}$	Output Voltage Reference	-1.38		-1.26	-1.38		-1.26	-1.38		-1.26	V
$V_{IHCMR}$	Input HIGH Voltage Common Mode Range (Differential) (Note 3)	-2.5		-0.4	-2.5		-0.4	-2.5		-0.4	V
$I_{IH}$	Input HIGH Current			150			150			150	$\mu\text{A}$
$I_{IL}$	Input LOW Current	0.5			0.5			0.5			$\mu\text{A}$

NOTE: Devices are designed to meet the DC specifications shown in the above table, after thermal equilibrium has been established. The circuit is in a test socket or mounted on a printed circuit board and transverse air flow greater than 500 lfm is maintained.

1. Input and output parameters vary 1:1 with  $V_{CC}$ .  $V_{EE}$  can vary +0.8 V / -0.5 V.
2. Outputs are terminated through a 50 ohm resistor to  $V_{CC}-2$  volts.
3.  $V_{IHCMR}$  min varies 1:1 with  $V_{EE}$ ,  $V_{IHCMR}$  max varies 1:1 with  $V_{CC}$ . The  $V_{IHCMR}$  range is referenced to the most positive side of the differential input signal. Normal operation is obtained if the HIGH level falls within the specified range and the peak-to-peak voltage lies between  $V_{PPmin}$  and 1 V.

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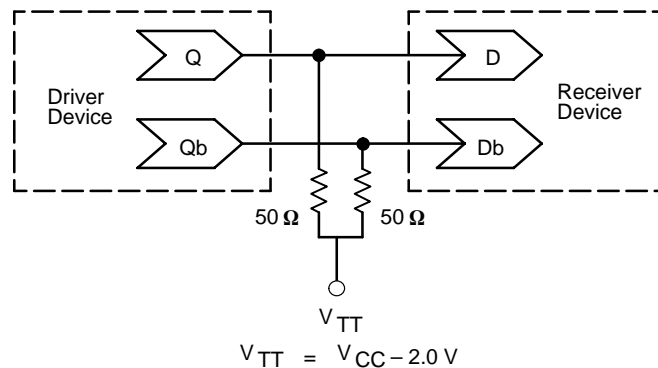
**AC CHARACTERISTICS**  $V_{CC}= 5.0\text{ V}; V_{EE}= 0.0\text{ V}$  or  $V_{CC}= 0.0\text{ V}; V_{EE}= -5.0\text{ V}$  (Note 1)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
$f_{\max}$	Maximum Toggle Frequency		TBD			TBD			TBD		GHz
$t_{\text{PLH}}$ $t_{\text{PHL}}$	Propagation Delay DATA→Q/ $\bar{Q}$ SEL→Q/ $\bar{Q}$	350 440		550 690	360 440		560 690	380 460		580 710	ps
$t_{\text{SKEW}}$	Input Skew $D_n, D_m$ to Q			100			100			100	ps
$t_{\text{JITTER}}$	Cycle-to-Cycle Jitter		TBD			TBD			TBD		ps
$V_{\text{PP}}$	Input Swing (Note 1.)	150		1000	150		1000	150		1000	mV
$t_r$ $t_f$	Output Rise/Fall Times Q (20% – 80%)	125		375	125		375	125		375	ps

1. 10 Series:  $V_{EE}$  can vary +0.06 V / -0.5 V.

100 Series:  $V_{EE}$  can vary +0.8 V / -0.5 V.

1.  $V_{\text{PP}}(\text{min})$  is minimum input swing for which AC parameters guaranteed. The device has a DC gain of  $\approx 40$ .



**Figure 1. Typical Termination for Output Driver and Device Evaluation  
(See Application Note AND8020 – Termination of ECL Logic Devices.)**

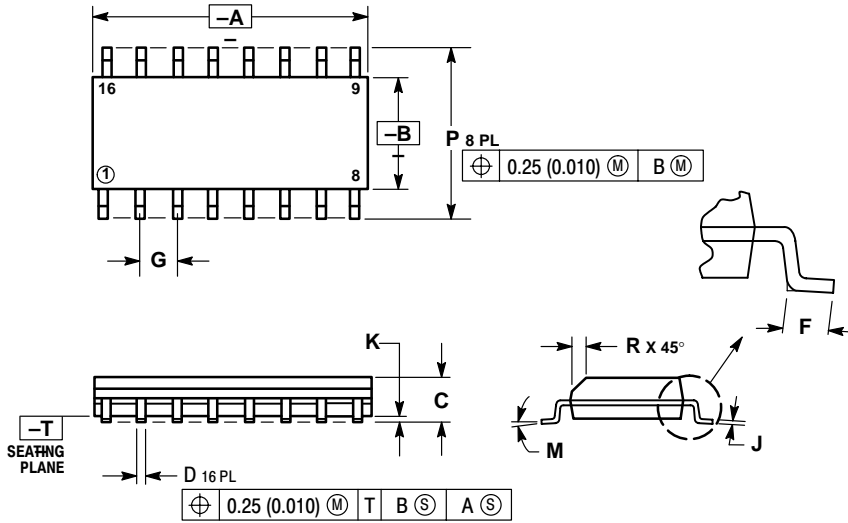
## Resource Reference of Application Notes

- AN1404** – ECLinPS Circuit Performance at Non-Standard  $V_{\text{IH}}$  Levels
- AN1405** – ECL Clock Distribution Techniques
- AN1406** – Designing with PECL (ECL at +5.0 V)
- AN1503** – ECLinPS I/O SPICE Modeling Kit
- AN1504** – Metastability and the ECLinPS Family
- AN1560** – Low Voltage ECLinPS SPICE Modeling Kit
- AN1568** – Interfacing Between LVDS and ECL
- AN1596** – ECLinPS Lite Translator ELT Family SPICE I/O Model Kit
- AN1650** – Using Wire-OR Ties in ECLinPS Designs
- AN1672** – The ECL Translator Guide
- AND8001** – Odd Number Counters Design
- AND8002** – Marking and Date Codes
- AND8020** – Termination of ECL Logic Devices

# MC10EL57, MC100EL57

## PACKAGE DIMENSIONS

SO-16  
D SUFFIX  
CASE 751B-05  
ISSUE J



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

## Notes

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